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(21)Application number :	2000-236211	(71)Applicant :	SHARP CORP
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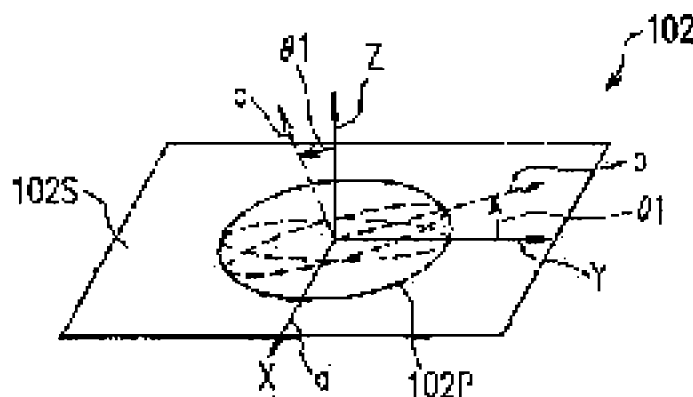
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(54) LIQUID CRYSTAL DISPLAY DEVICE

(57) Abstract:

PROBLEM TO BE SOLVED: To realize a liquid crystal display device characterized by a wide viewing angle, high display quality and fast response by using a homogeneously aligned liquid crystal display element with fast response and improving the viewing angle dependence with an optical retardation plate of a kind and composition different from the conventional one.

SOLUTION: The liquid crystal display device is provided with a pair of polarizers arranged on the both sides of the liquid crystal display element and a tilted optical retardation plate containing an index ellipsoid having three



principal refractive indexes n_a , n_b , n_c . The liquid crystal layer contains the liquid crystal molecules. Directions and sizes of the pretilt angles of the liquid crystal molecules arranged on each of the alignment layers are mutually the same. The liquid crystal layer is aligned homogeneously. A relation $n_a = n_b > n_c$ holds with respect to the three principal refractive indexes n_a , n_b , n_c of the index ellipsoid. The direction of the principal refractive index n_c which is in parallel with the normal of the tilted optical retardation plate surface and the direction of the principal refractive index n_a or n_b in the surface are inclined by taking the direction of the principal refractive index of either n_a or n_b as an axis.

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(33) 優先権主張国 日本 (J P)

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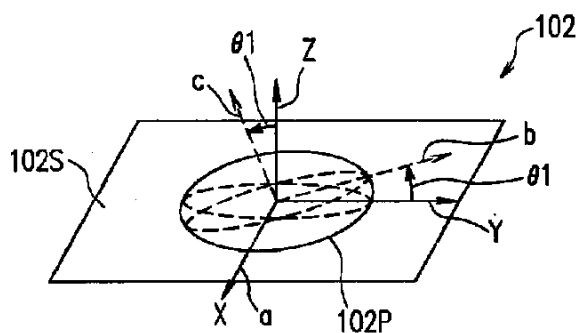
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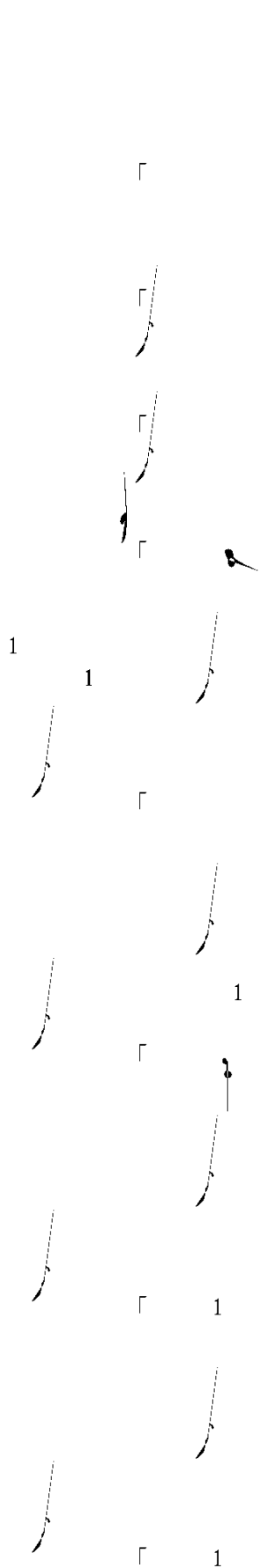
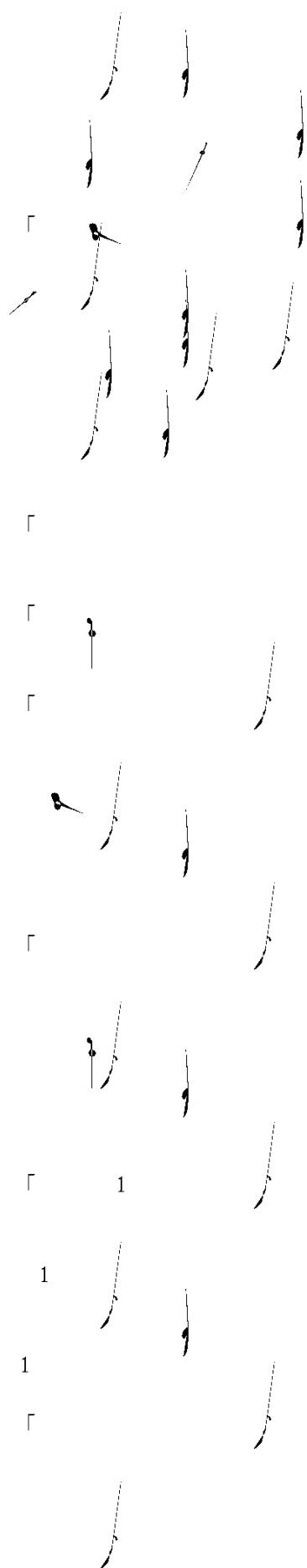
弁理士 山本 秀策

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(54) 【発明の名称】 液晶表示装置

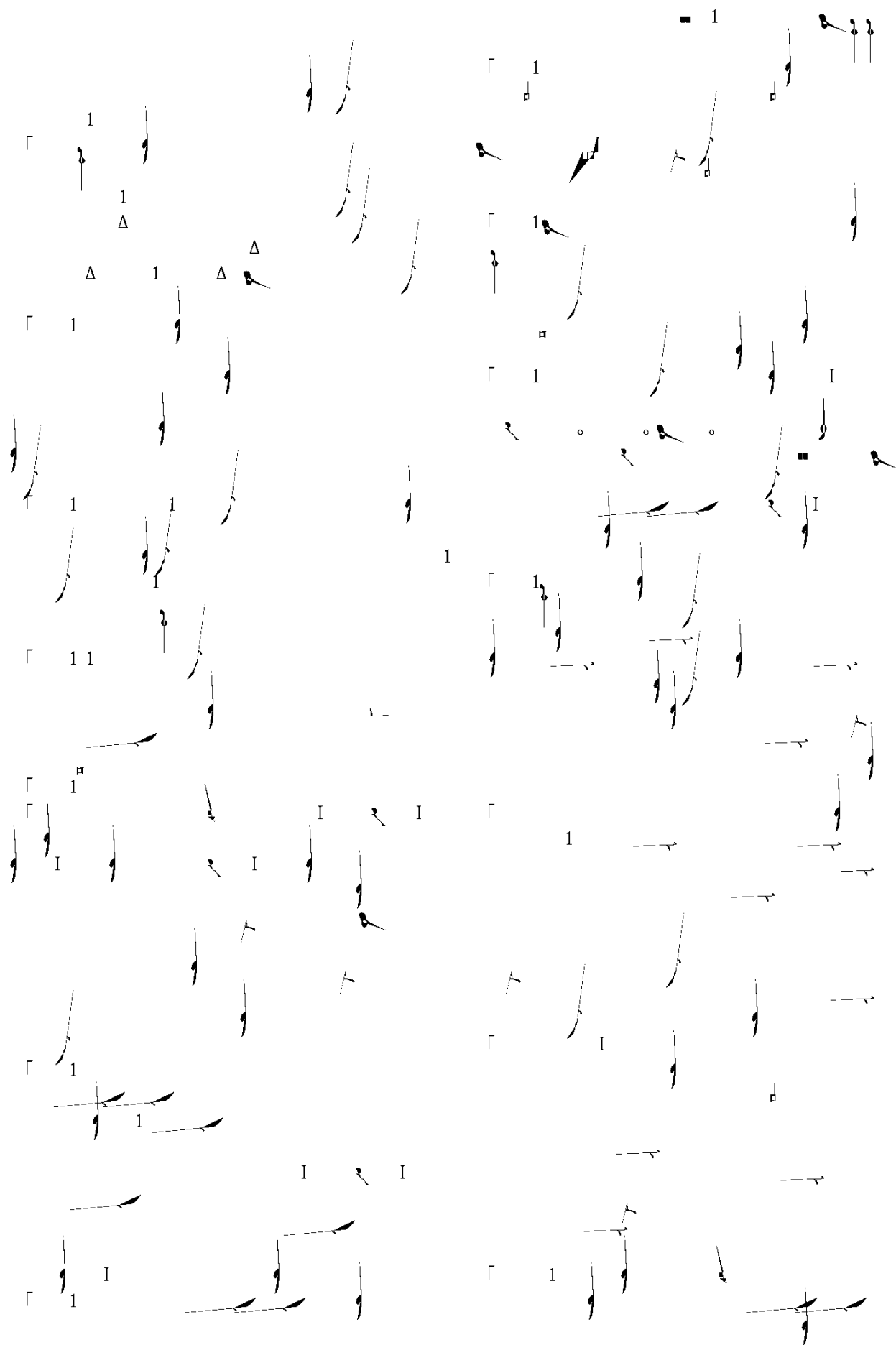


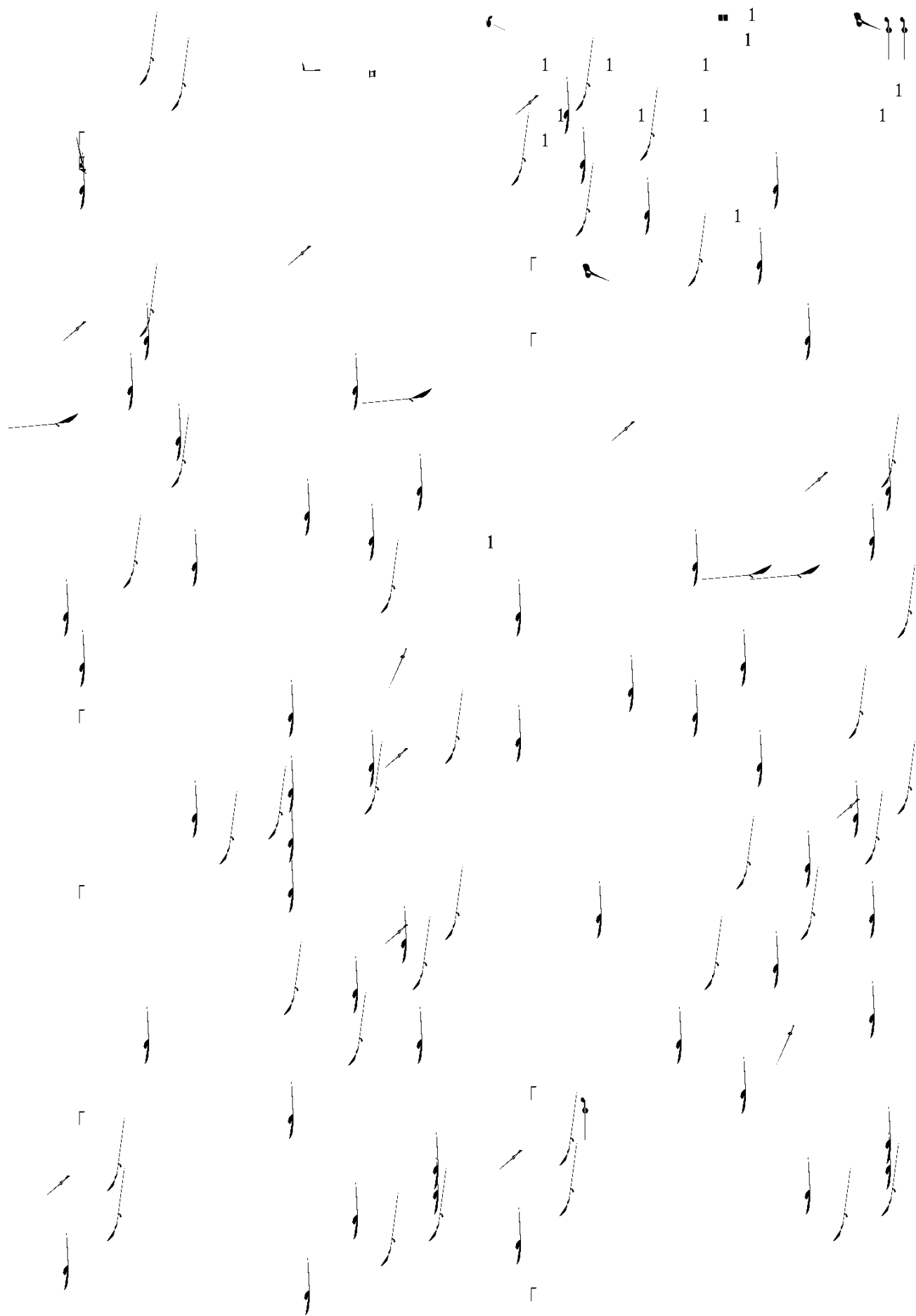


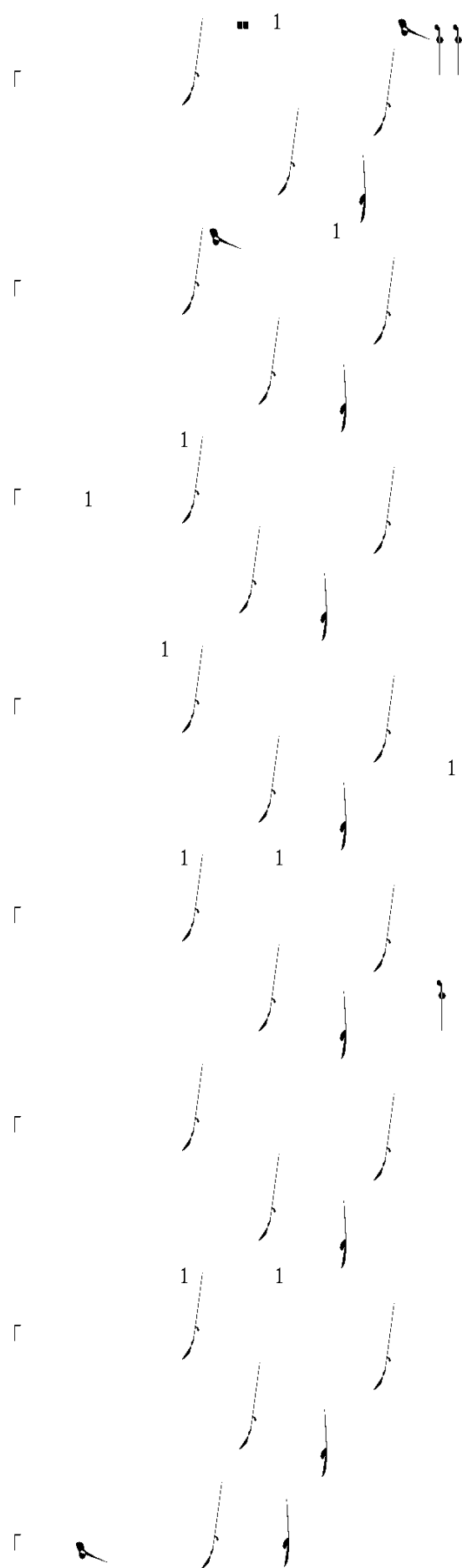


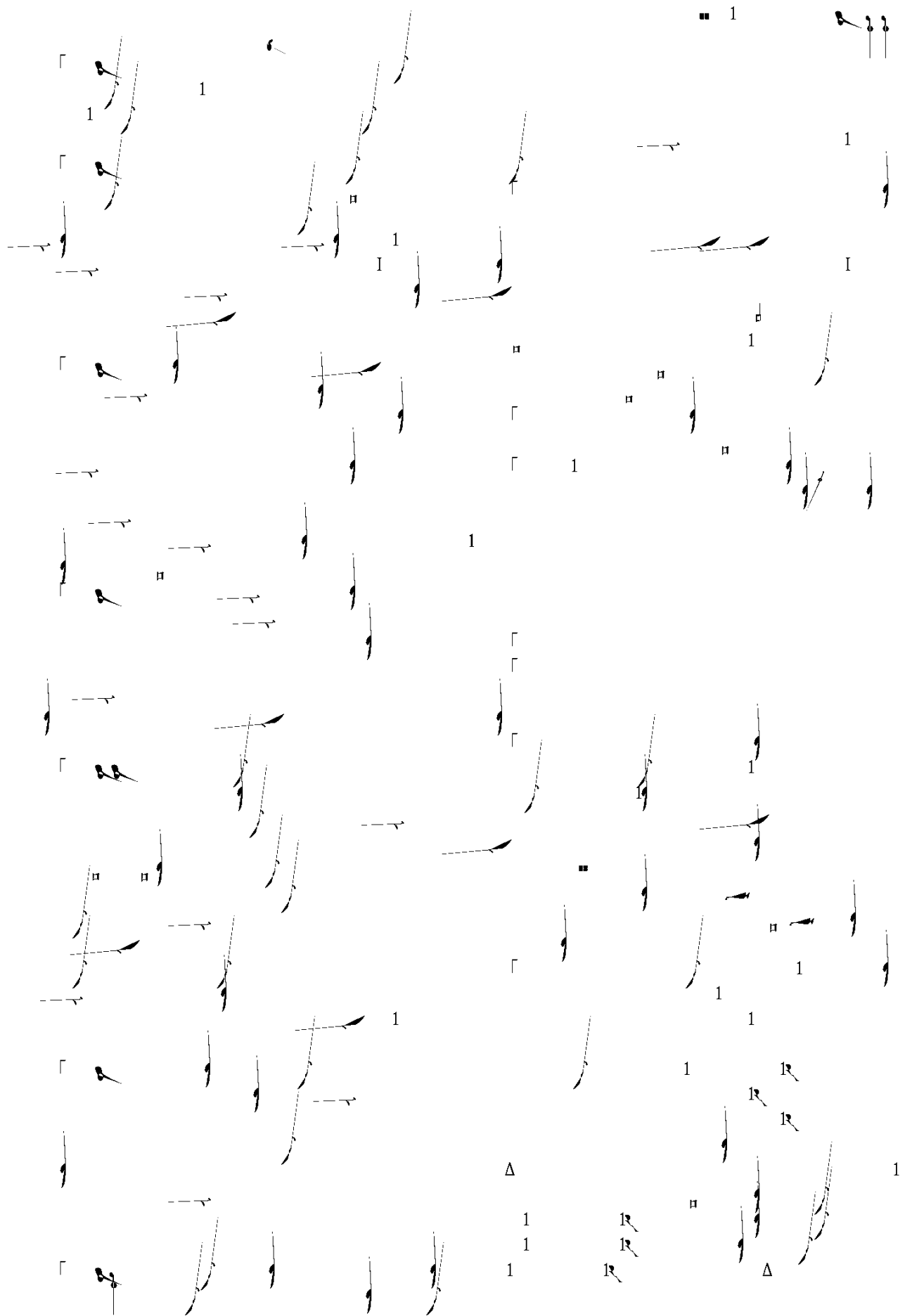




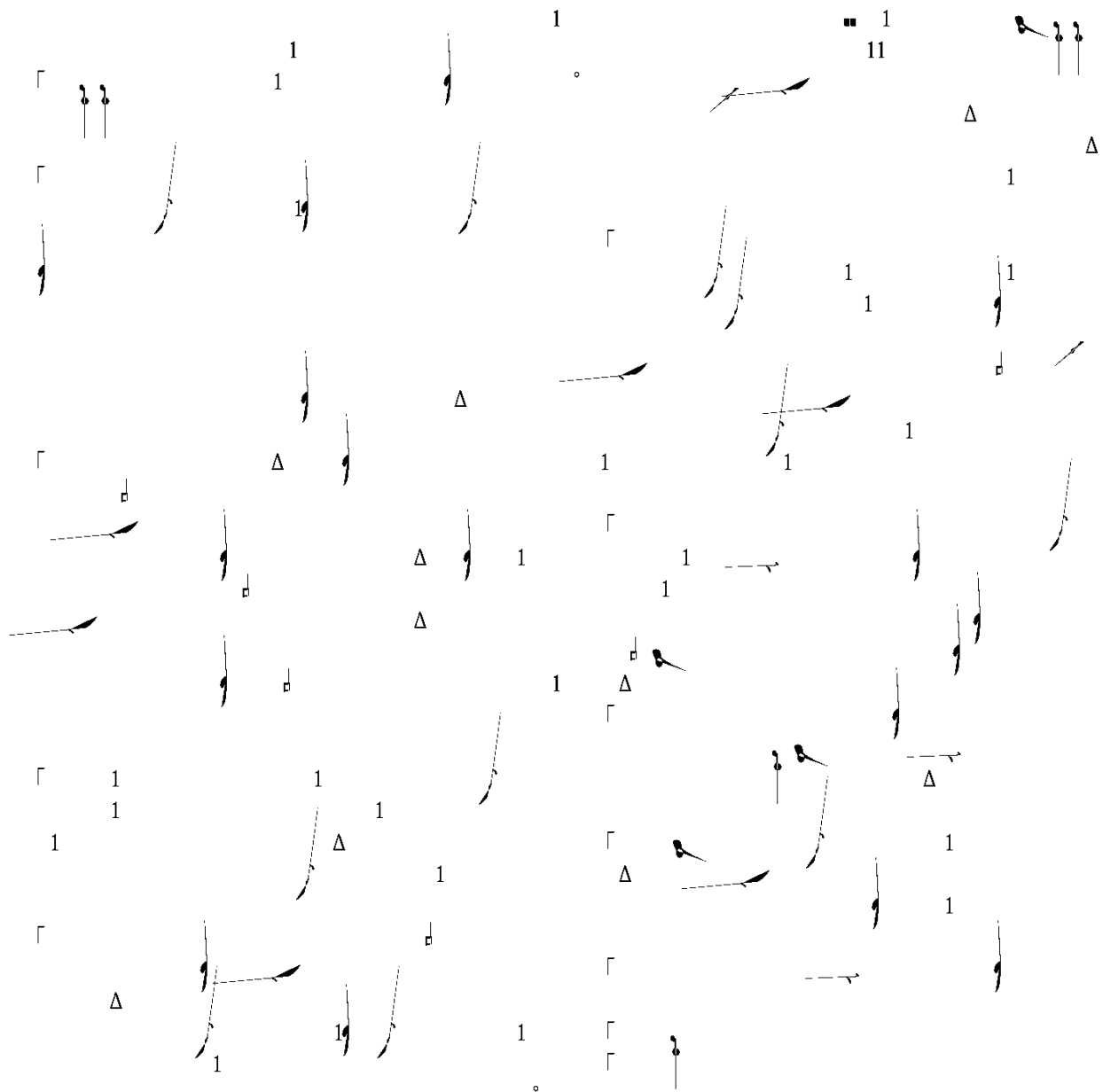








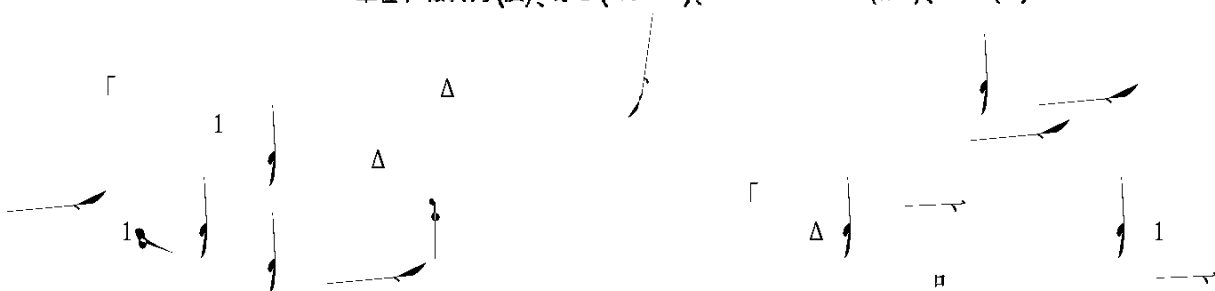


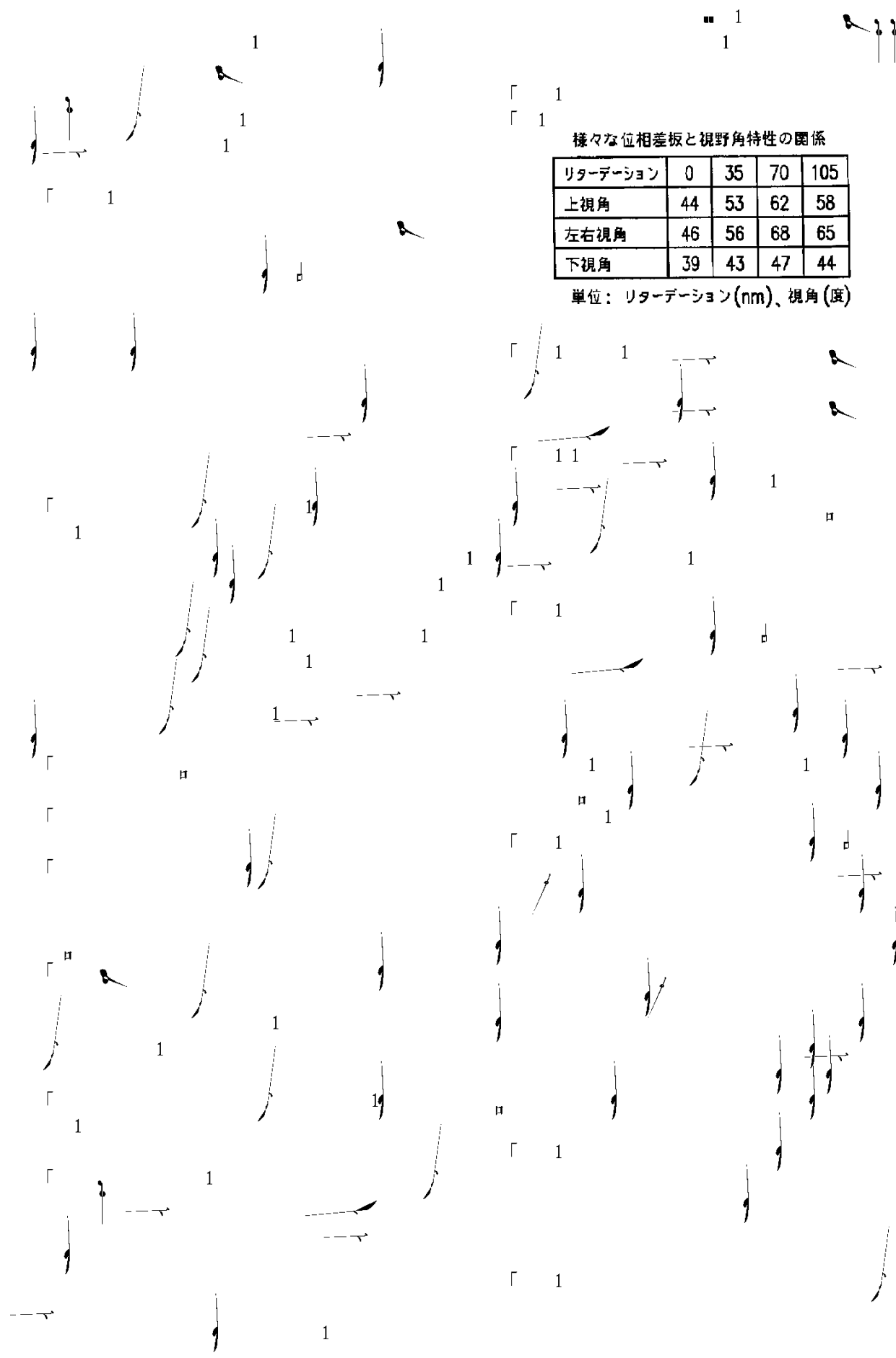


様々な位相差板と視野角特性の関係

傾斜角	10	20	30	40	50	60	70	80
厚さ	205	53	25	15	11	8.3	7.0	6.4
リターデーション	615	159	75	45	33	25	21	19
上視角	15	29	59	44	39	34	32	30
左右視角	20	67	53	46	42	42	42	42
下視角	40	37	37	39	42	43	44	45

単位：傾斜角(度)、厚さ(ミクロン)、リターデーション(nm)、視角(度)

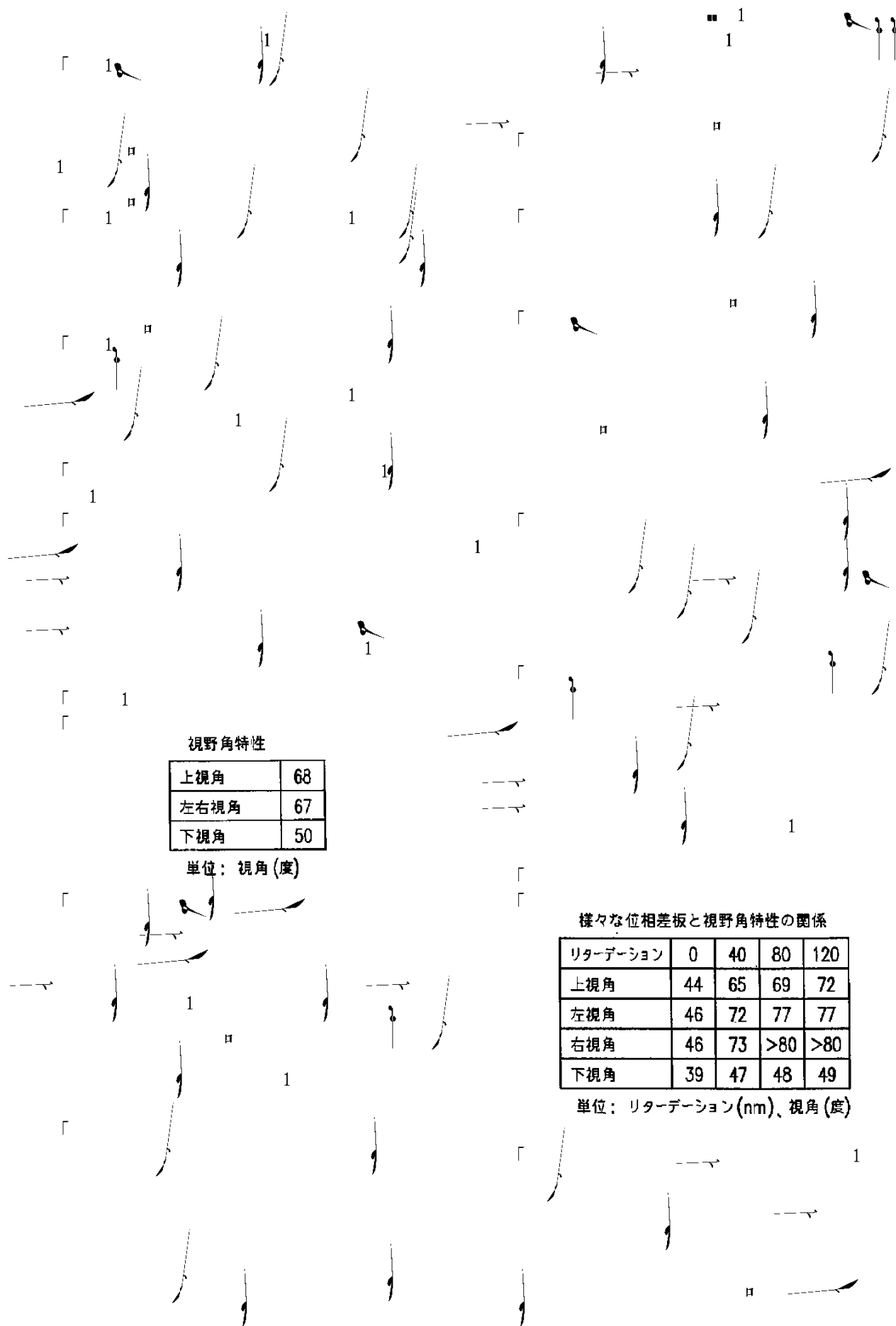




様々な位相差板と視野角特性の関係

リターデーション	0	35	70	105
上視角	44	53	62	58
左右視角	46	56	68	65
下視角	39	43	47	44

単位：リターデーション(nm)、視角(度)



視野角特性

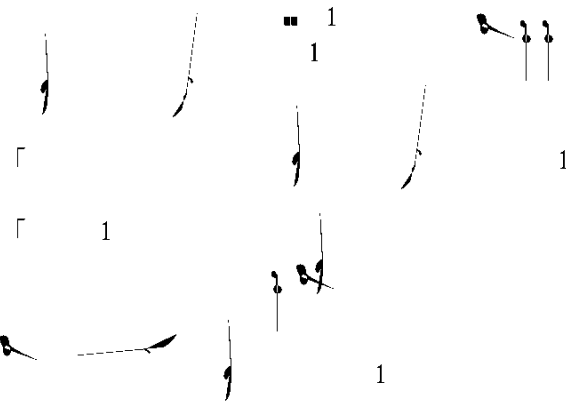
上視角	68
左右視角	67
下視角	50

単位：視角(度)

様々な位相差板と視野角特性の関係

リターデーション	0	40	80	120
上視角	44	65	69	72
左視角	46	72	77	77
右視角	46	73	>80	>80
下視角	39	47	48	49

単位：リターデーション(nm)、視角(度)



コントラスト10を与える上視角

傾斜角 \ 厚さ	20	25	30	40	60
20	53	57	61	65	32
22.5	54	75	70	63	30
30	56	60	>80	59	25
40	58	53	53	48	23
60	47	47	47	48	28

単位：傾斜角（度）、厚さ（ミクロン）、視角（度）

コントラスト10を与える左視角

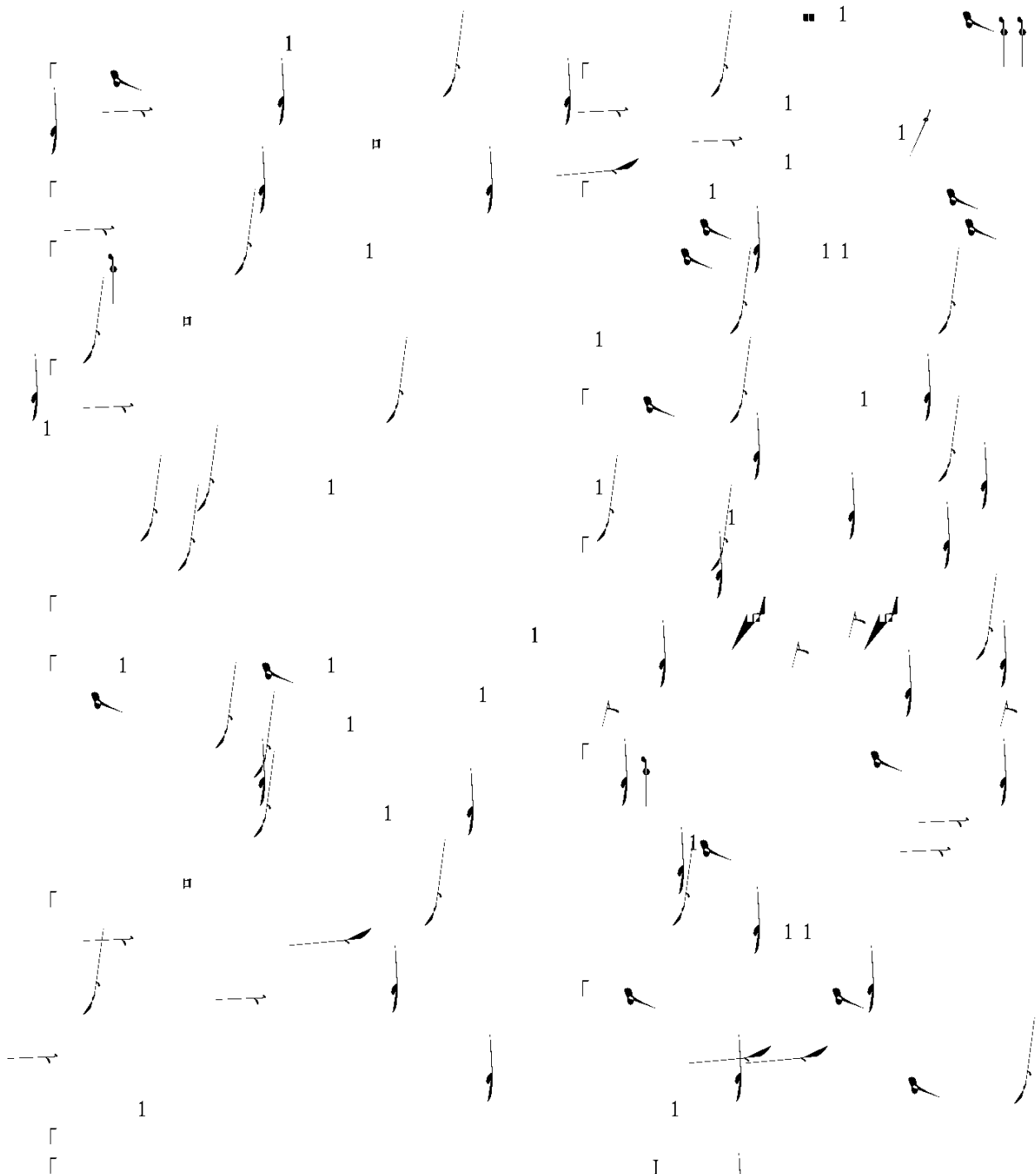
傾斜角 \ 厚さ	20	25	30	40	60
20	57	58	60	67	56
22.5	57	61	62	69	62
30	55	55	67	72	70
40	53	52	57	>80	>80
60	48	50	52	55	55

単位：傾斜角（度）、厚さ（ミクロン）、視角（度）

コントラスト10を与える下視角

傾斜角 \ 厚さ	20	25	30	40	60
20	47	47	47	47	47
22.5	45	47	45	42	39
30	44	43	42	39	35
40	42	42	39	33	24
60	40	40	35	31	23

単位：傾斜角（度）、厚さ（ミクロン）、視角（度）



コントラスト10を与える視角

厚さ方向のリターデーション	0	20	30	70
上視角	>80	>80	70	65
左右視角	67	75	79	80
下視角	42	44	46	47

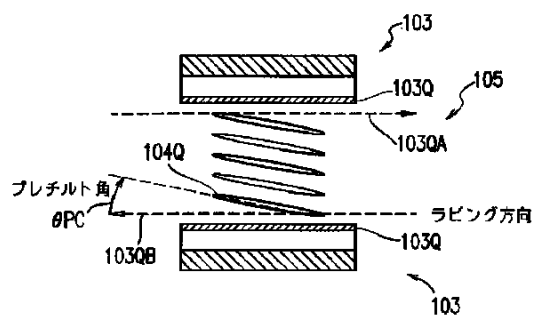
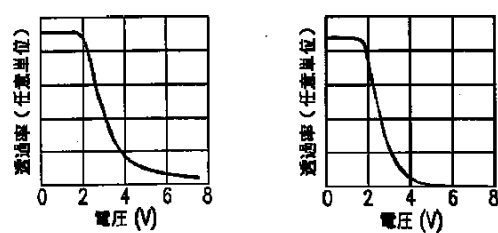
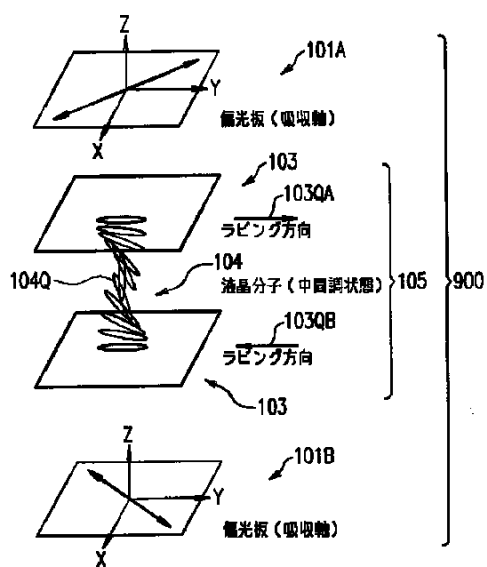
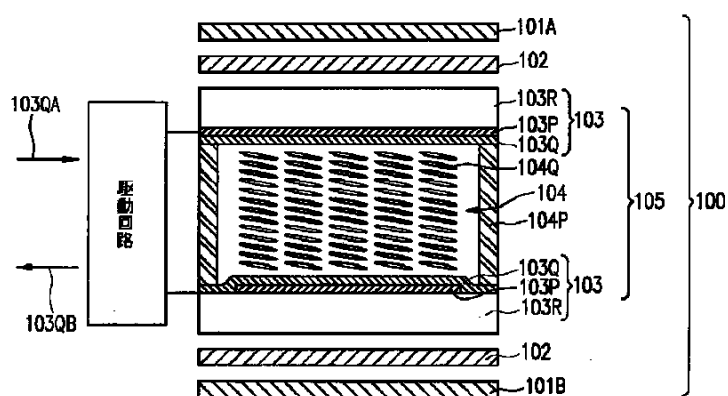
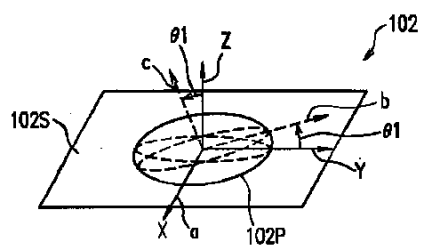
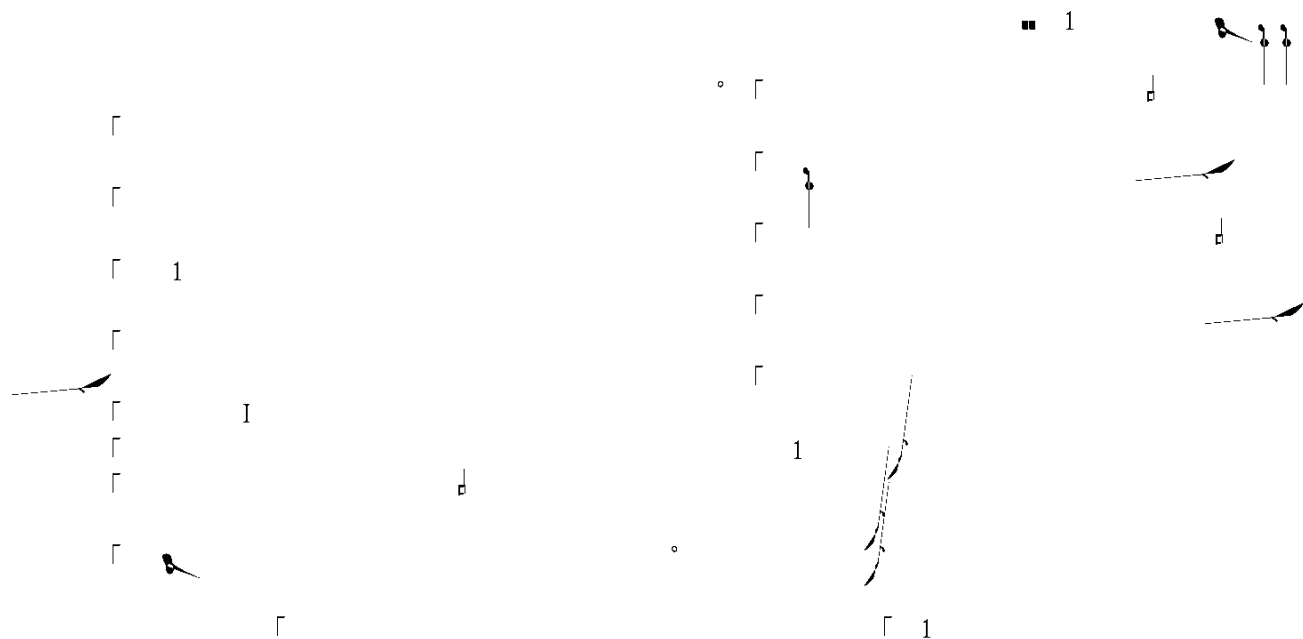
単位：厚さ方向のリターデーション(nm)、視角(度)

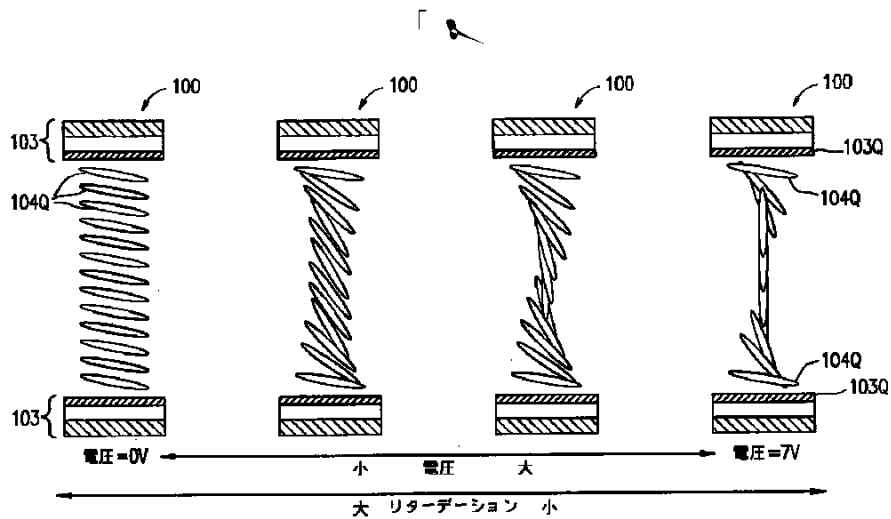
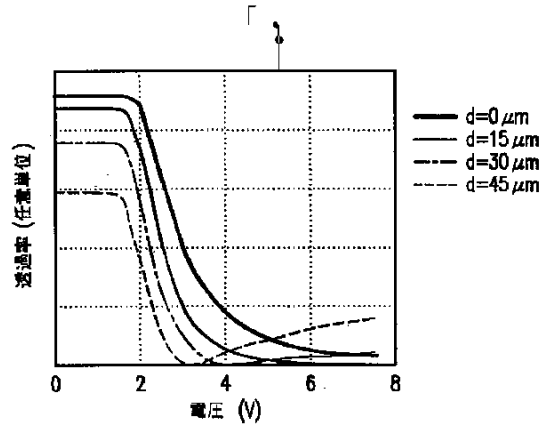
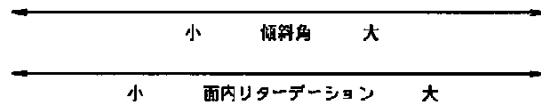
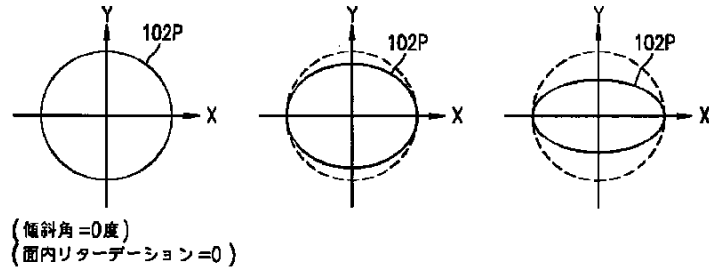
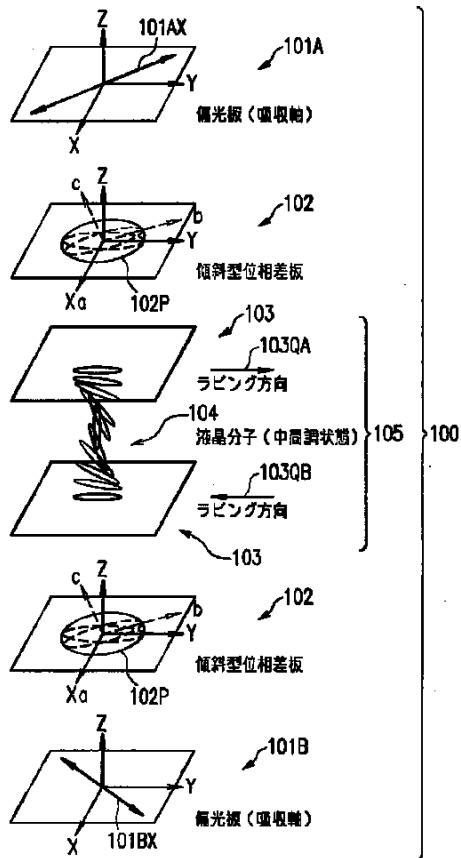
(負の位相差板のリターデーションは、
 $d \times (n_x - n_z)$ で与えられる。
 ただし、 $n_x = n_y$)

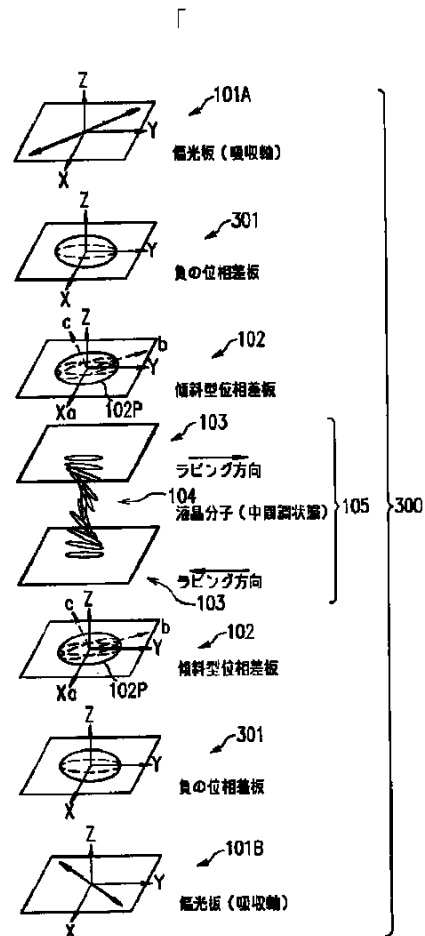
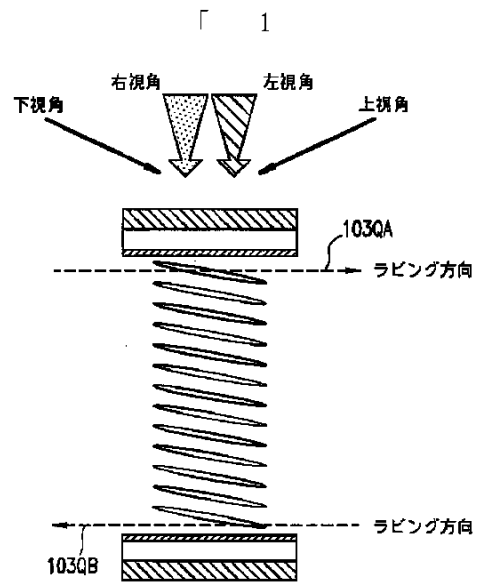
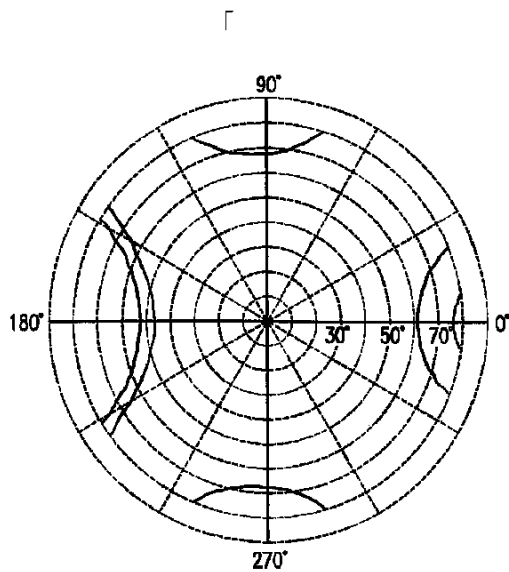
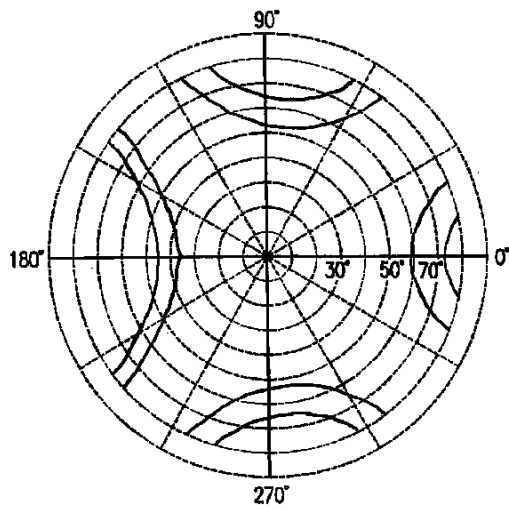
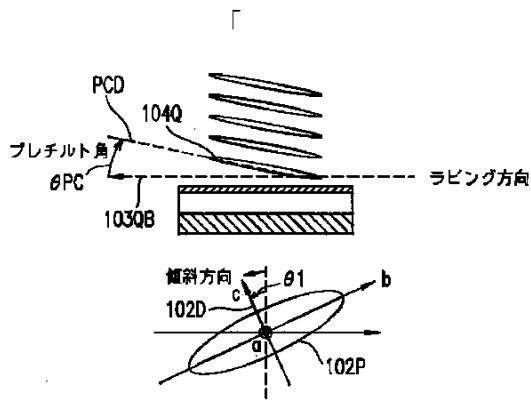


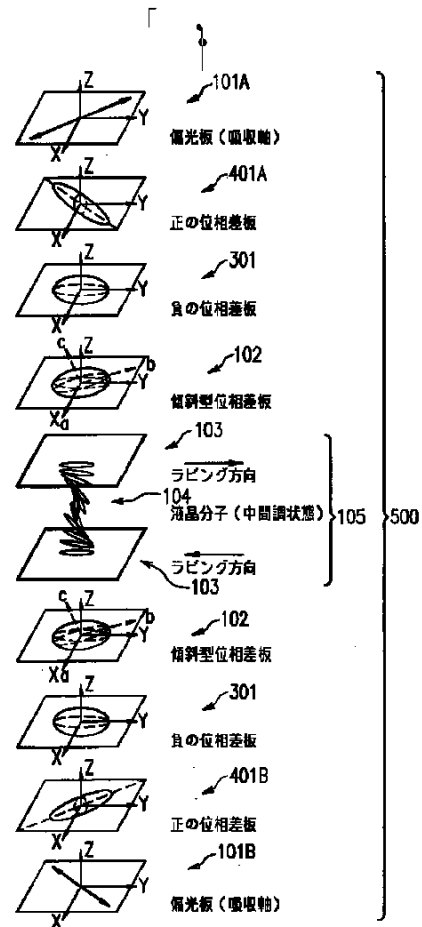
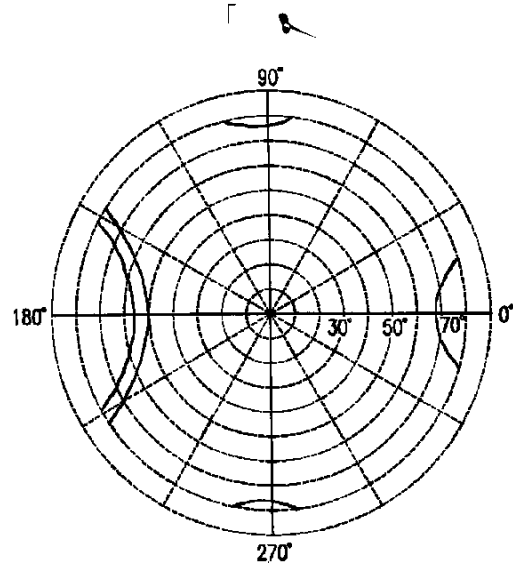
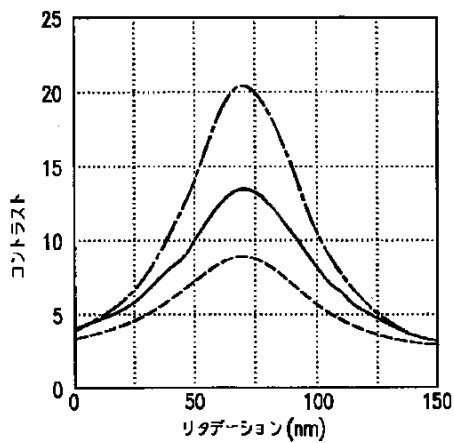
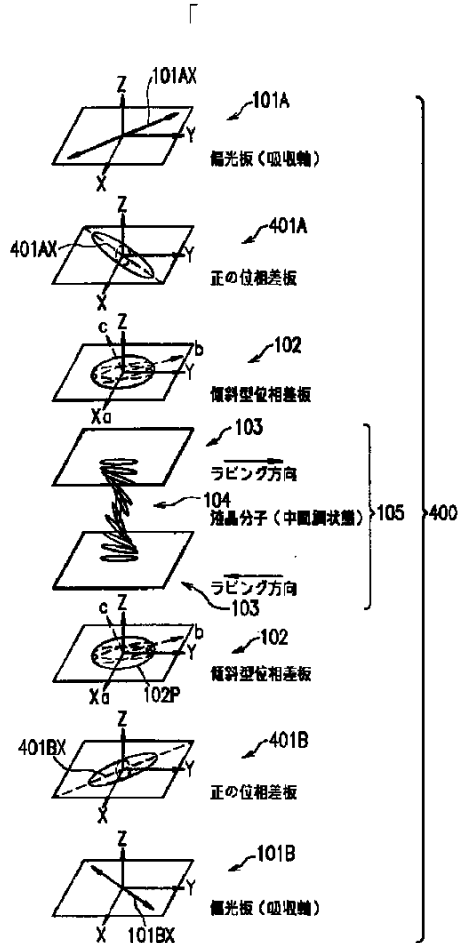
Handwritten musical notation on a page with a grid background. The notation includes various musical symbols such as notes, rests, and clefs, along with handwritten numbers (1, 2) and other markings. The notation is organized into several columns and rows, suggesting a structured musical exercise or score. The page is numbered 1 in the top right corner.

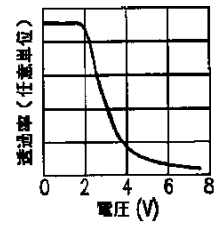
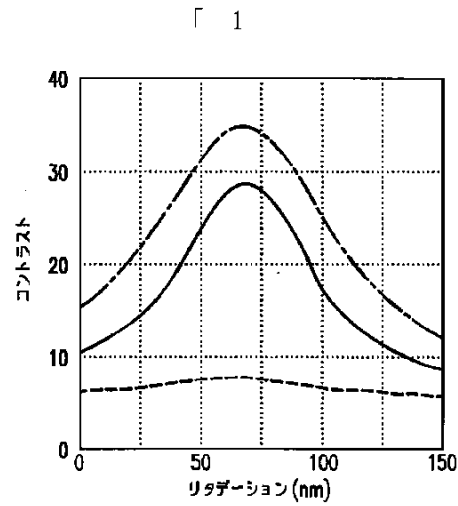
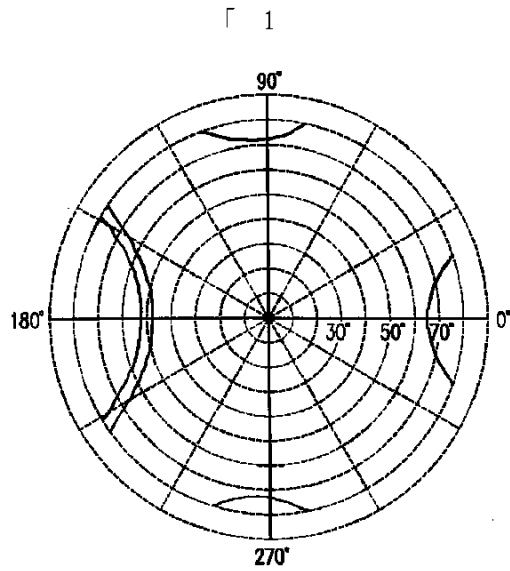
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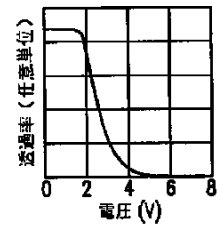
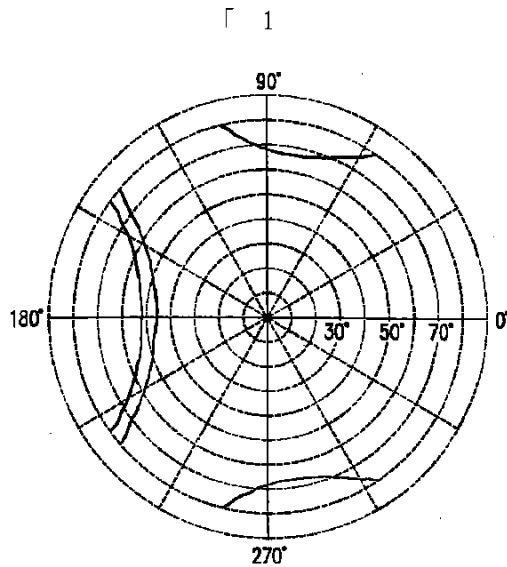
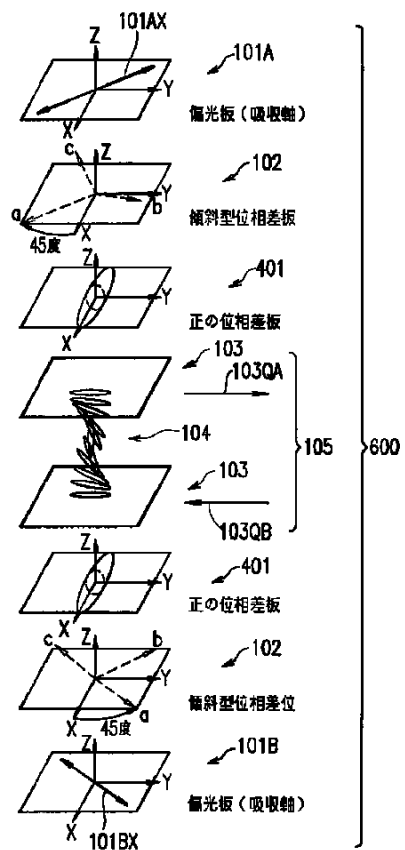






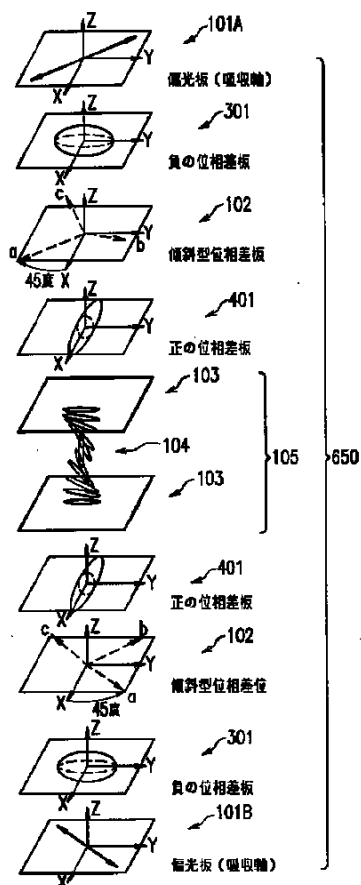


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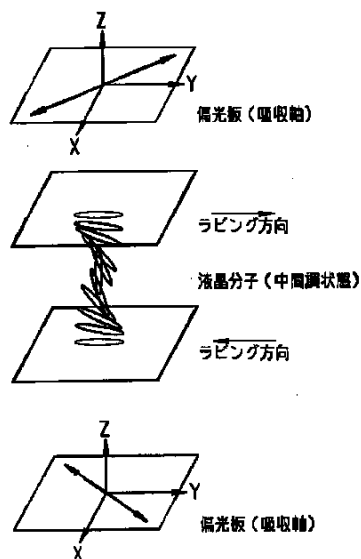




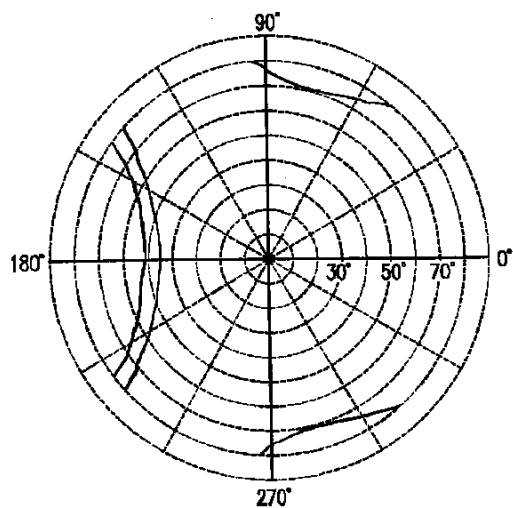
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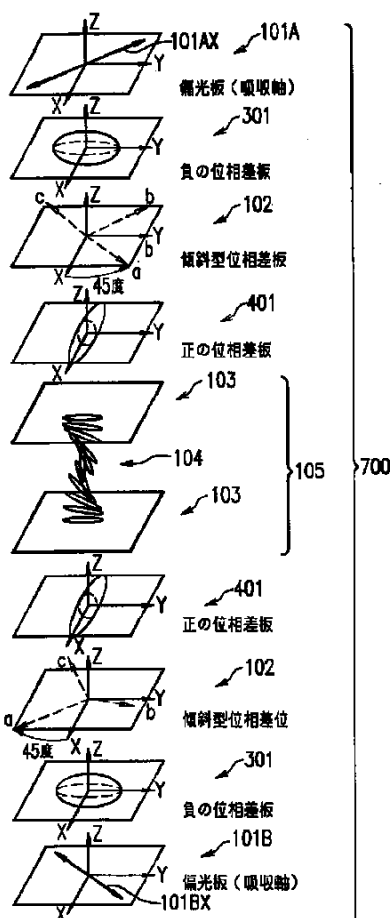
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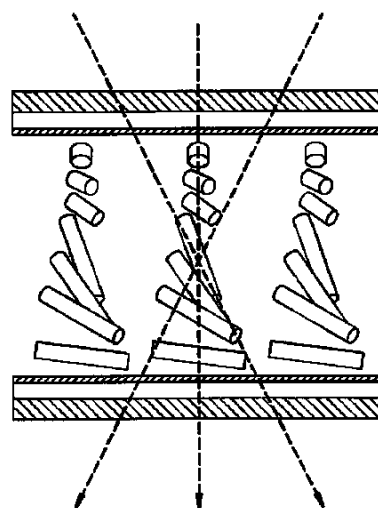
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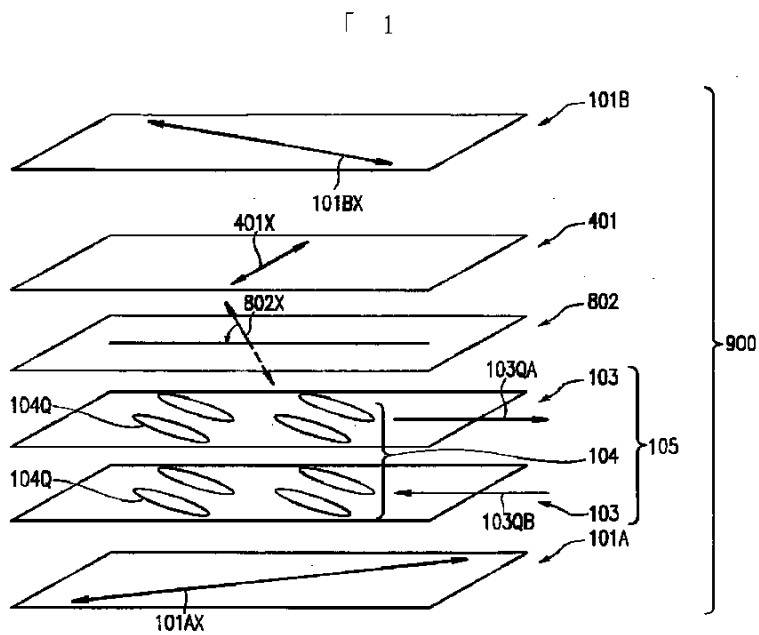
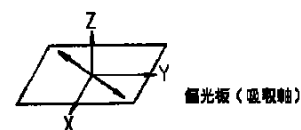
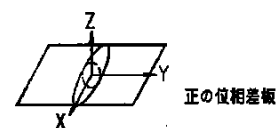
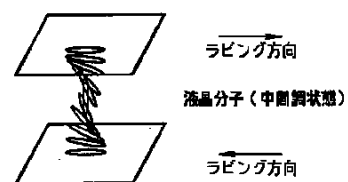
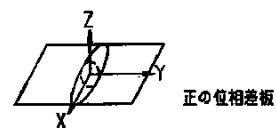
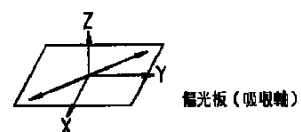
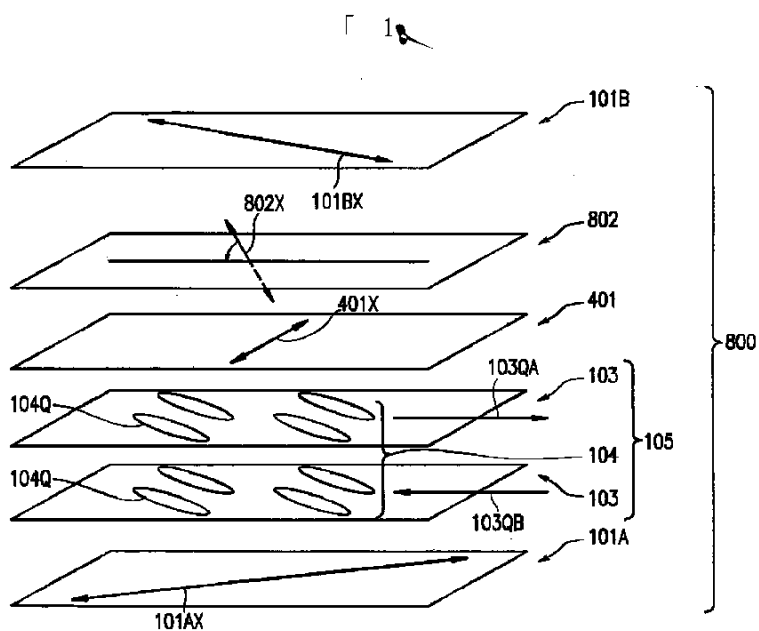


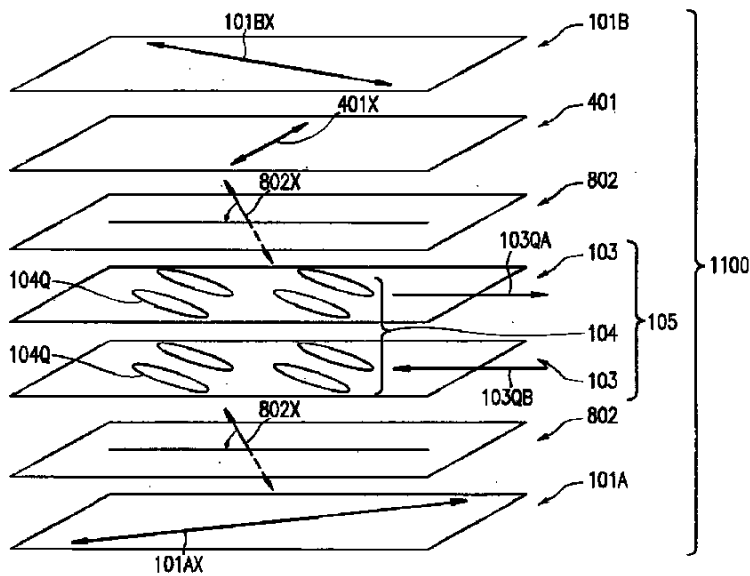
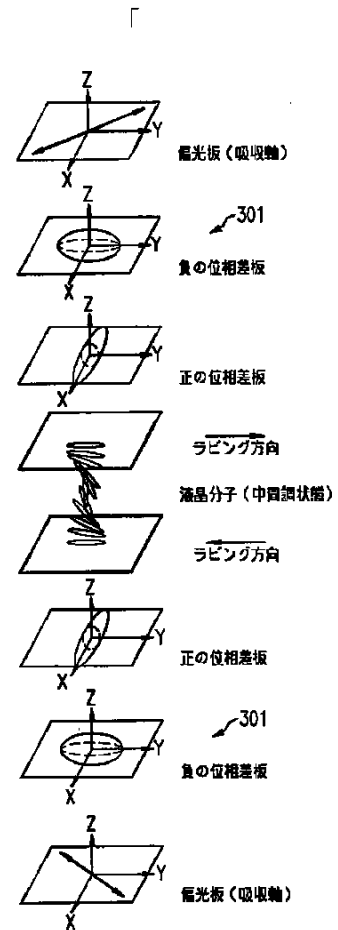
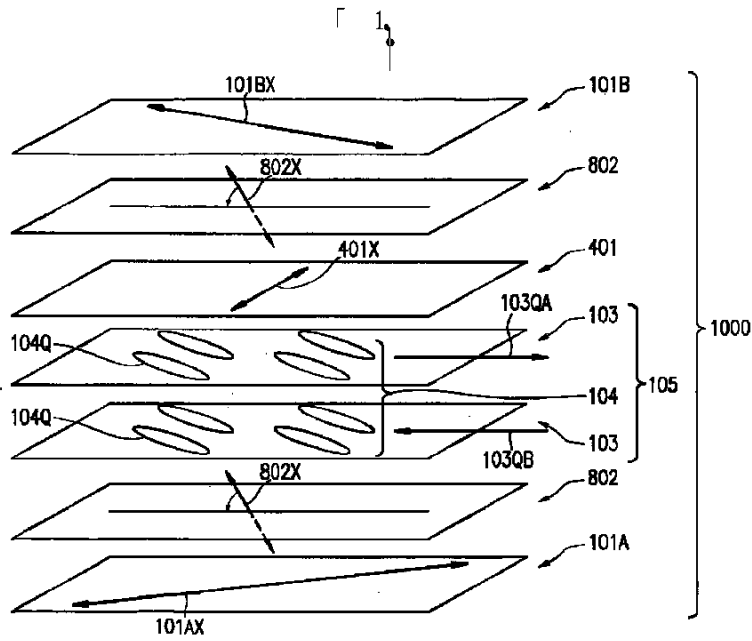
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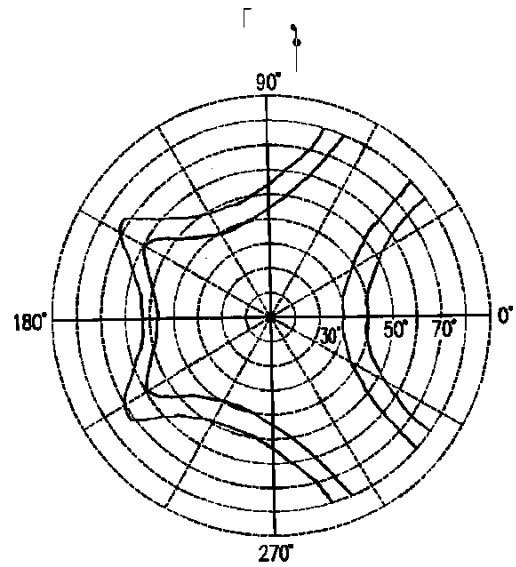
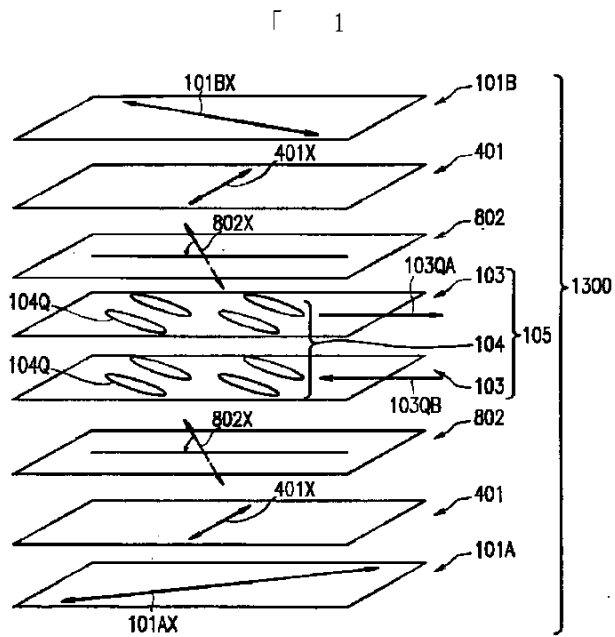
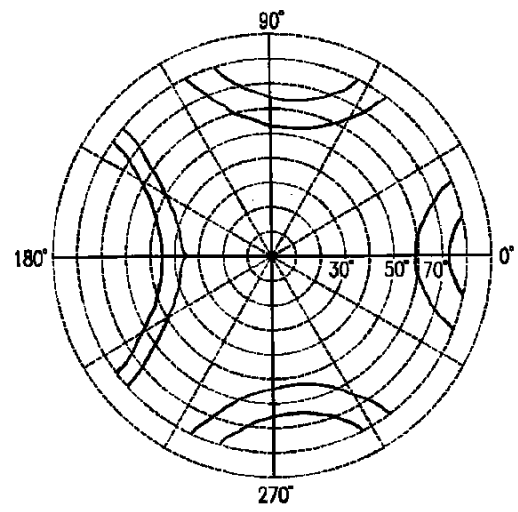
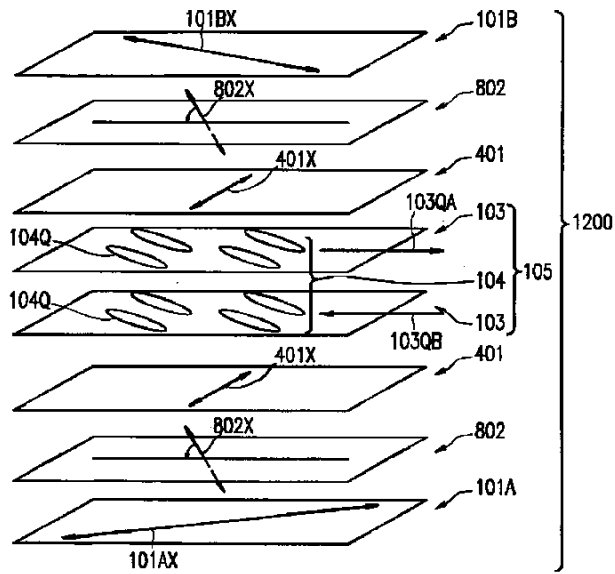


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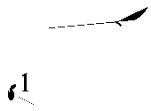
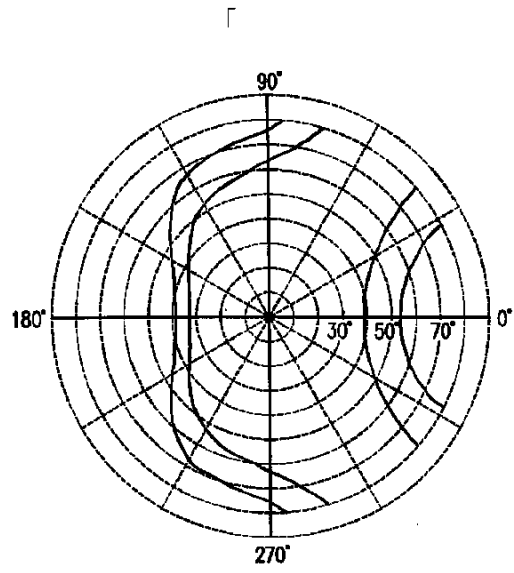






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